

THE EFFECT OF ARGON PLASMA CLEANING PROCESS ON WETTABILITY OF SILICON (100) SURFACE

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THE AIM:

The silicon wafer that has just been produced should have a chemically clean surface. However, it was reported that the silicon surface is covered with a thin layer of silicon dioxide. This occurs in the atmosphere of air because the wafer oxidizes. Thus the process of surface cleaning plays a key role in the microfabrication processes. The objective of this work was to examine the effect of argon cold plasma cleaning of silicon (100) surface on its wettability.

XPS ANALYSIS:

The XPS analysis was made before the plasma cleaning process in order to investigate the qualitative composition of the surface.

PLASMA CLEANING:

The surface was cleaned by means of the Pico system from Diener Electronic (Germany) using cold plasma at low pressure.

Gas: Ar, rate 100 %

Gas flow: 50 sccm

Process pressure: 0.4 mbar

Power of generator: 100 % (500 W)



Fig. 1: Water contact angle on the silicon (100) surface after argon plasma cleaning for 30 min.

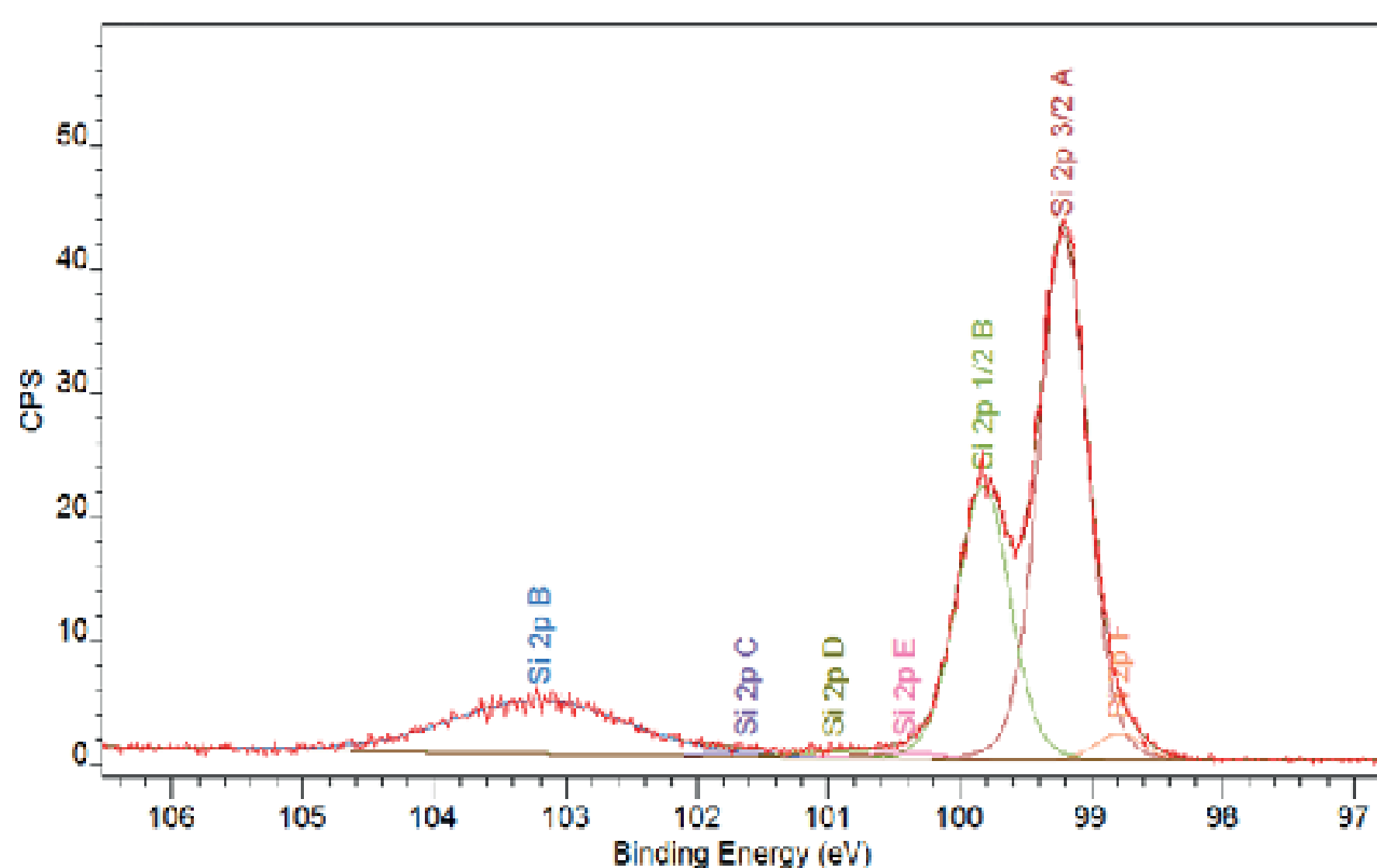


Fig. 2: XPS Si_{2p} signals of the silicon (100) surface.

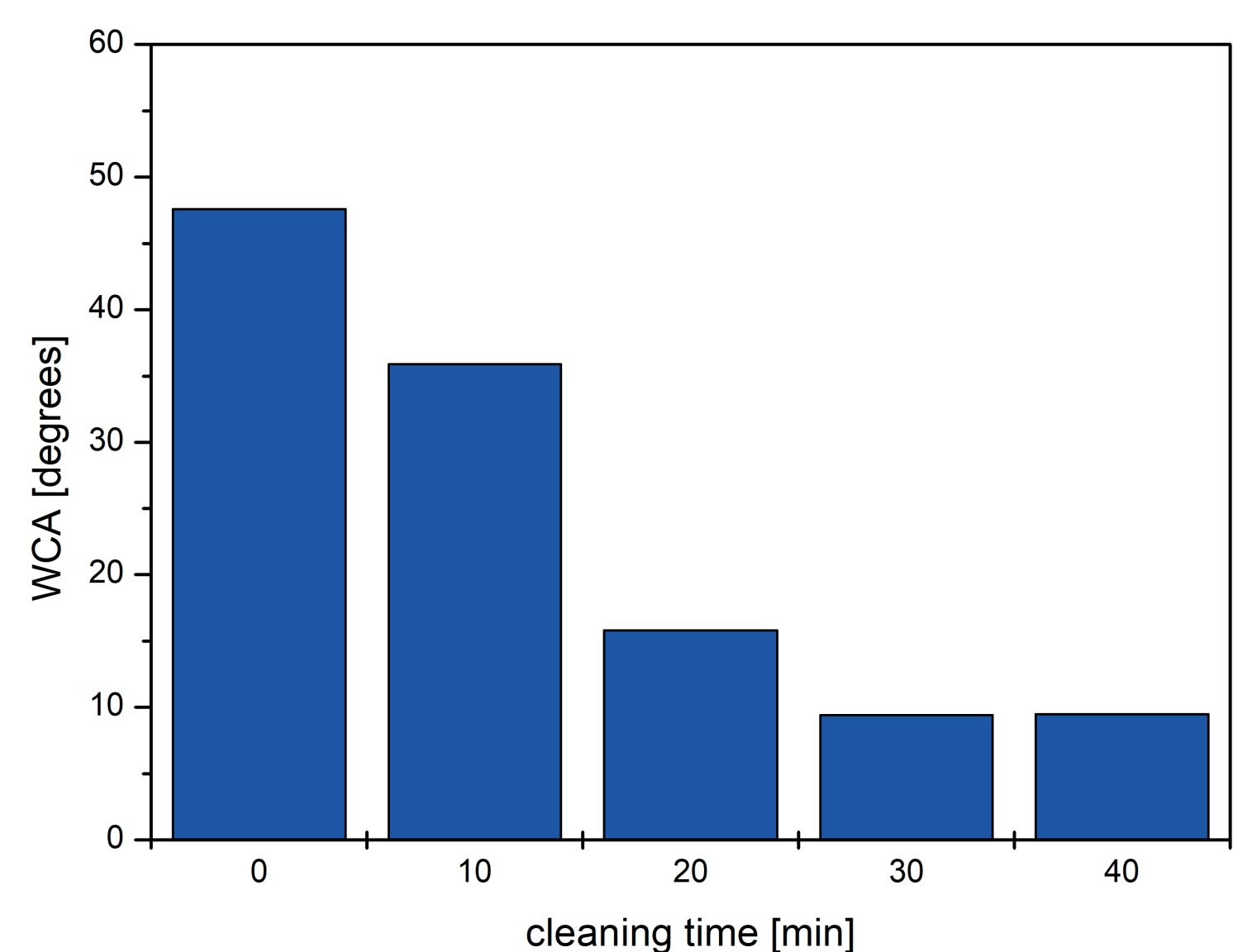


Fig. 3: Water contact angles (WCA) on the silicon (100) surface after plasma processing.

CONCLUSIONS:

- ✓ the XPS analysis confirmed the presence of the oxide on the silicon (100) surface;
- ✓ the argon plasma cleaning is a suitable technique for purging silicon (100) surface from oxide layer;
- ✓ the optimal processing time is 30 minutes;
- ✓ as a result of the process, the contact angle decreased to 9.4 degrees (water contact angle on silicon (100) is equal about 47.6° at 25°C).